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Sea Level and Chlorophyll-*a* Variability in the Kuroshio Extension from Altimeter and SeaWiFS

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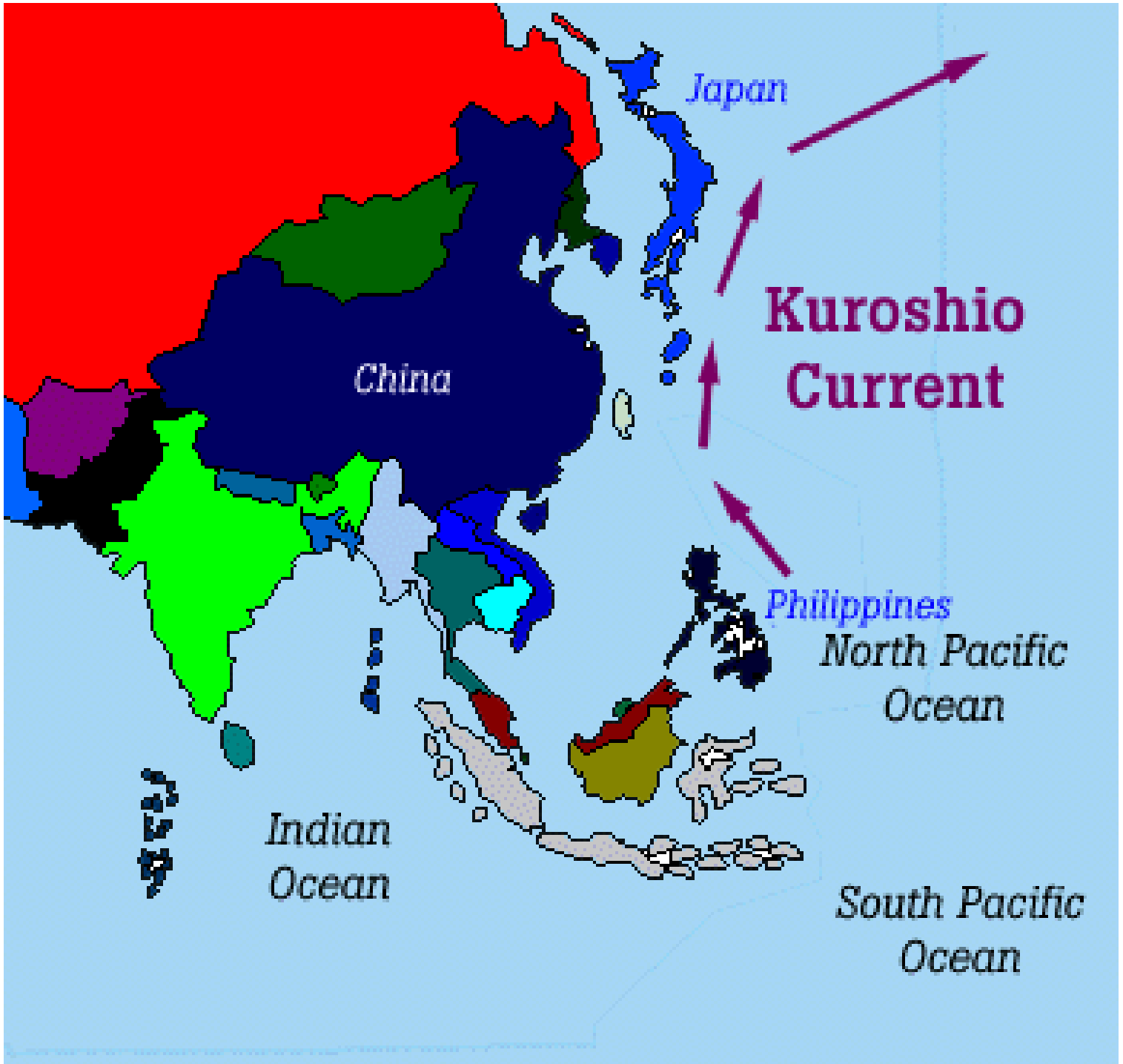

Japan
China
Kuroshio
Current
Philippines
North Pacific
Ocean
Indian
Ocean
South Pacific
Ocean

Kuroshio Extension (KE)

- To the east of Japan the Kuroshio swings eastward to form the Kuroshio Extension. The branching of this current in the region of 160 E results in the movement known as the North Pacific Current.

- The Kuroshio Extension (KE) current carries warm water at nearly 140 million cubic meters per second (140 Sv) eastward into the North Pacific.

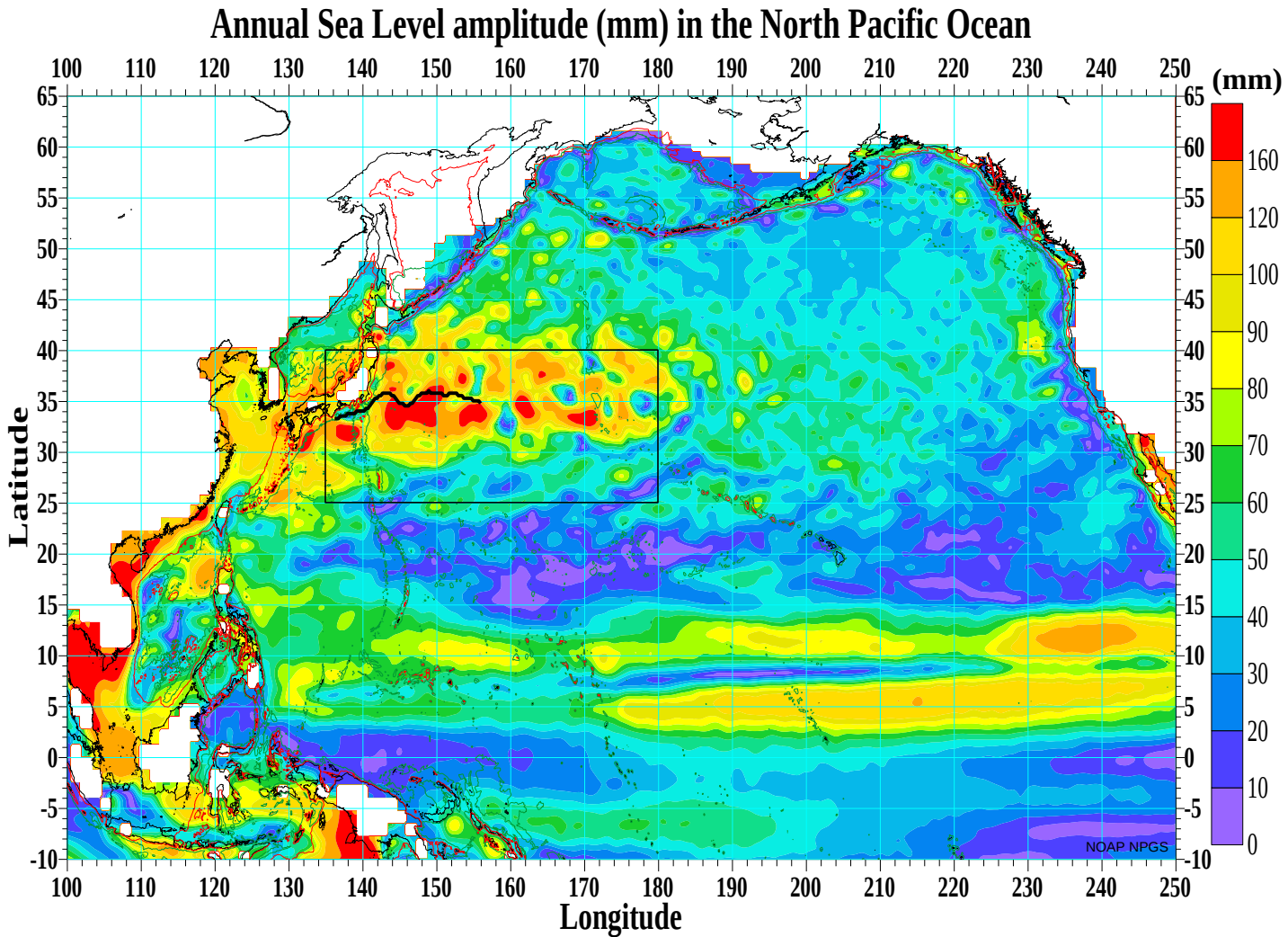
Purpose of the Study

- To examine biophysical characteristics along the Kuroshio Extension from satellite data

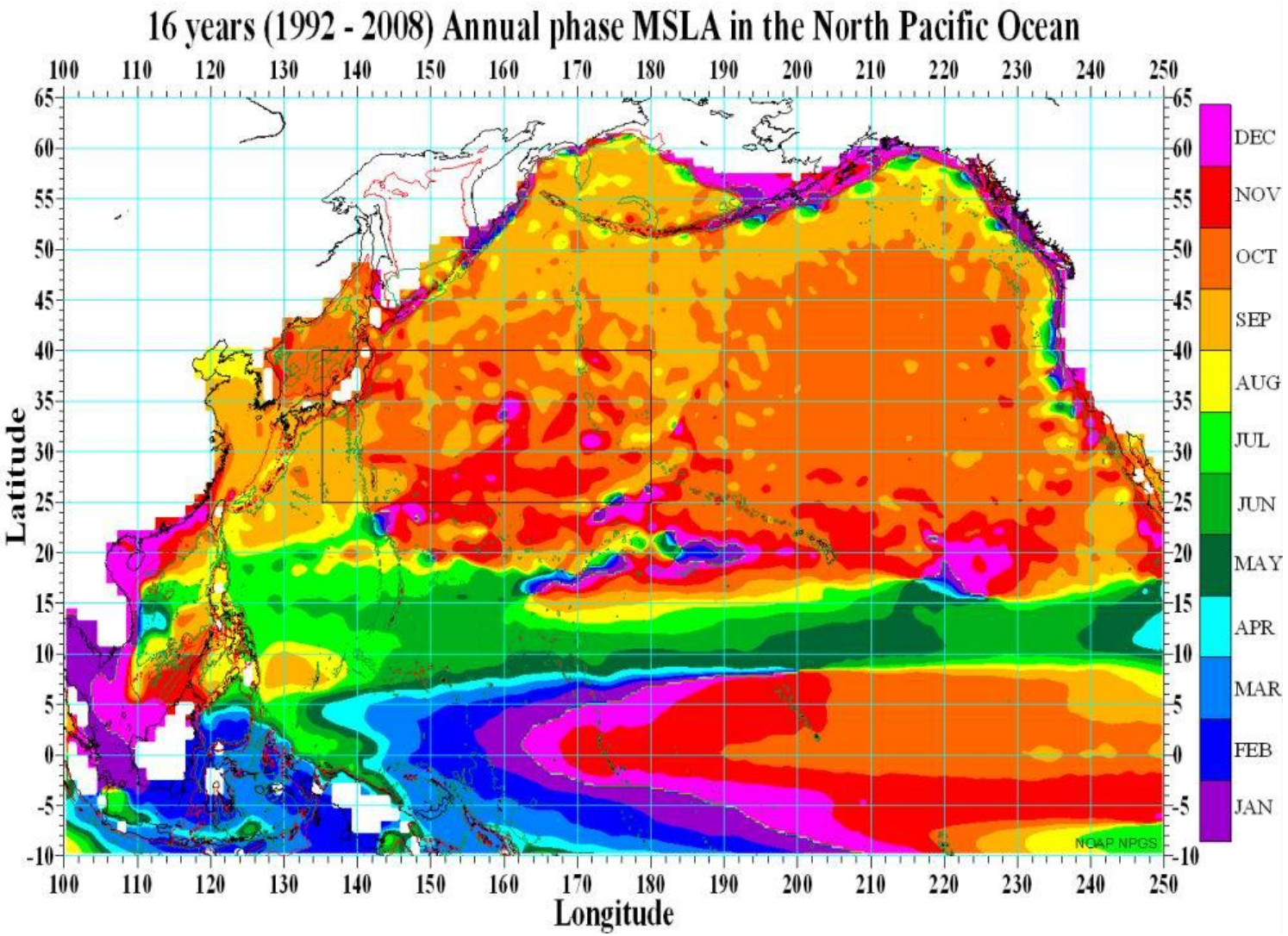
Sea Level Anomaly (SLA)

- SLA is measured by ERS 1/2 and TOPEX/Poseidon satellites at 7-day intervals.

Annual Sea Level amplitude (mm) in the North Pacific Ocean. The Kuroshio Extension route is associate with large annual amplitudes



Phase of the Annual Sea Level change in the North Pacific Ocean (1992-2008)

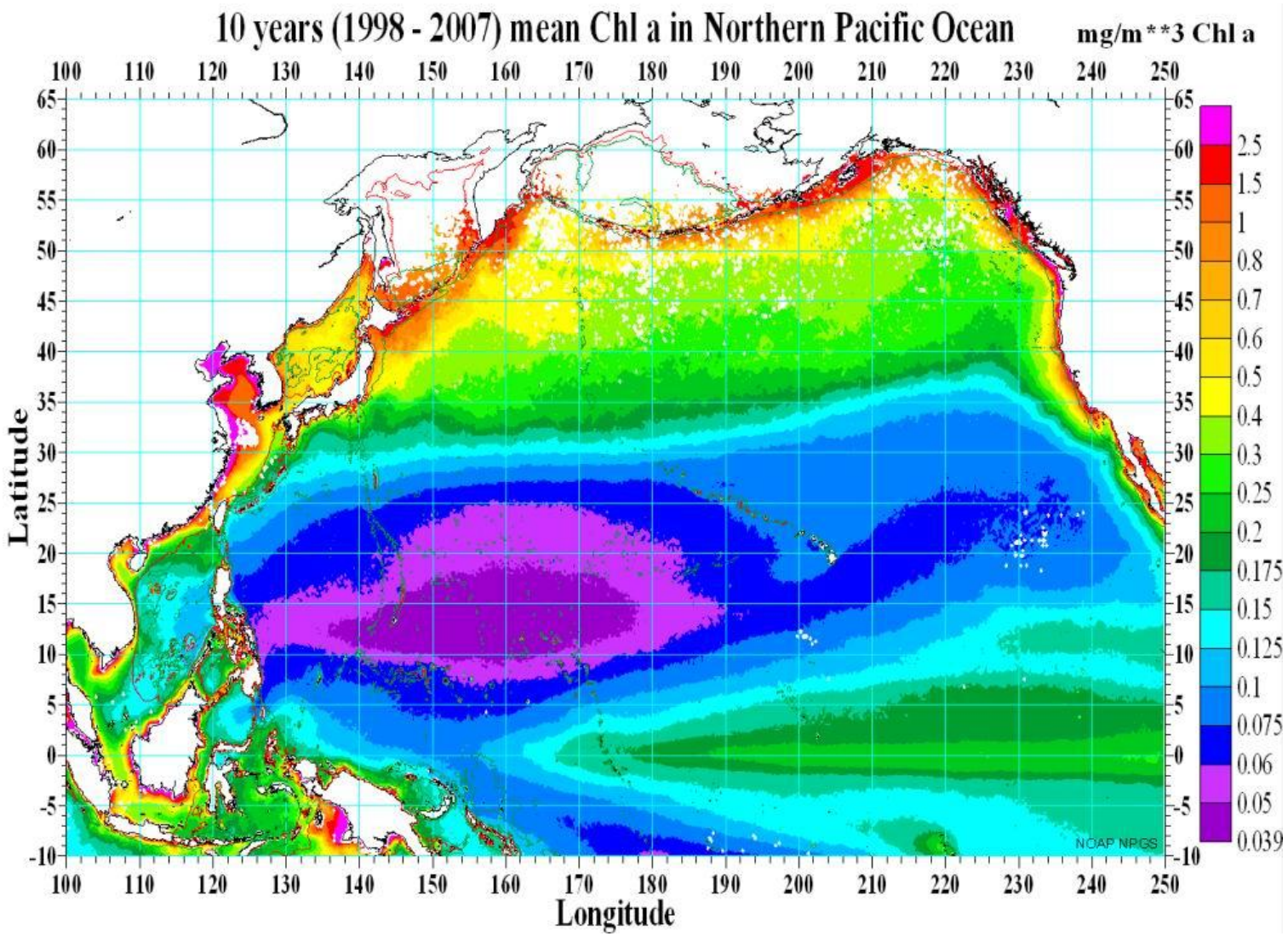


Annual Signal of SLA

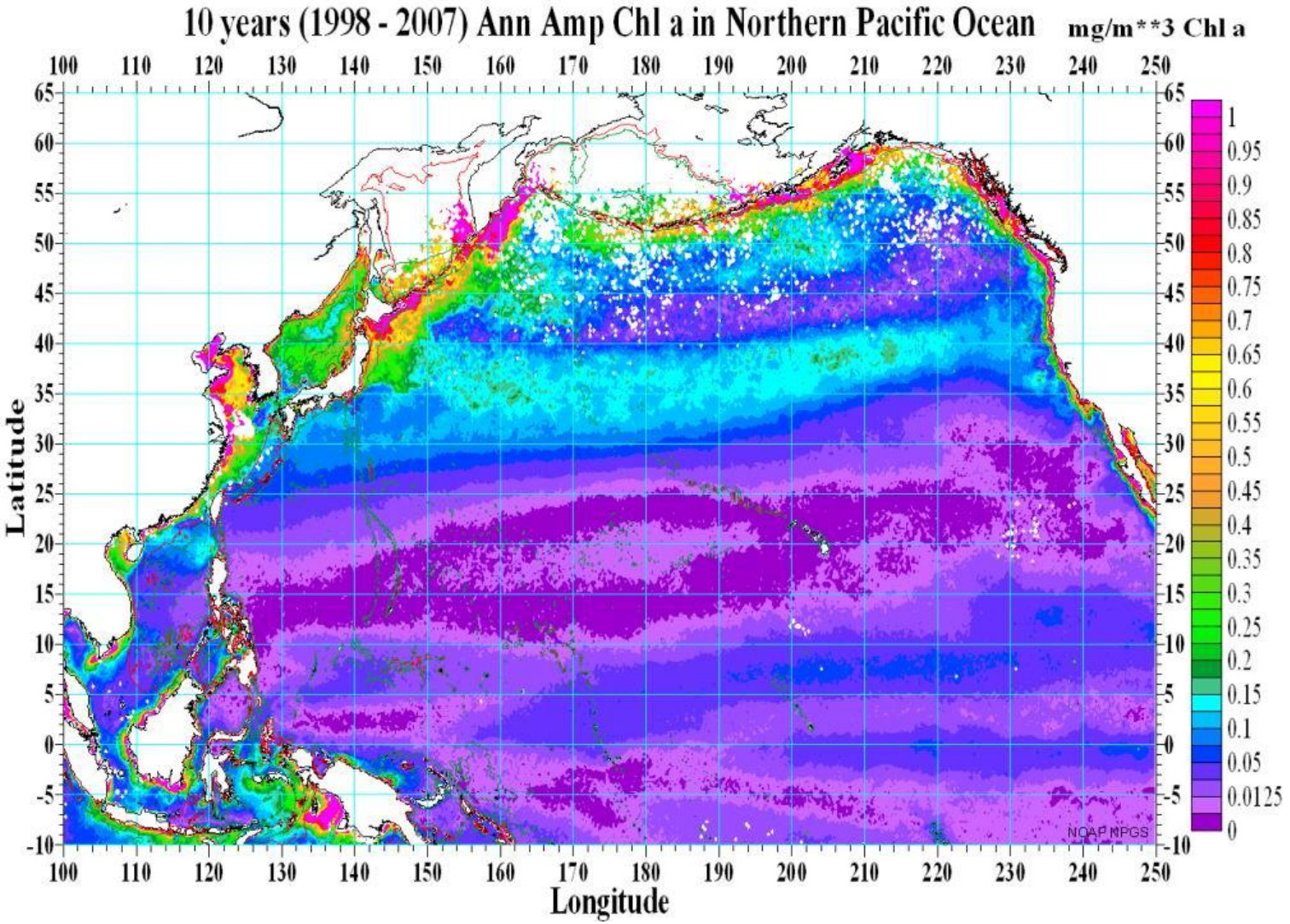
- (1) The annual signal is influenced partially by the ocean circulation and partially by the rise and fall of the sea surface.

- (2) Maximum annual elevation change is about ±20 cm.

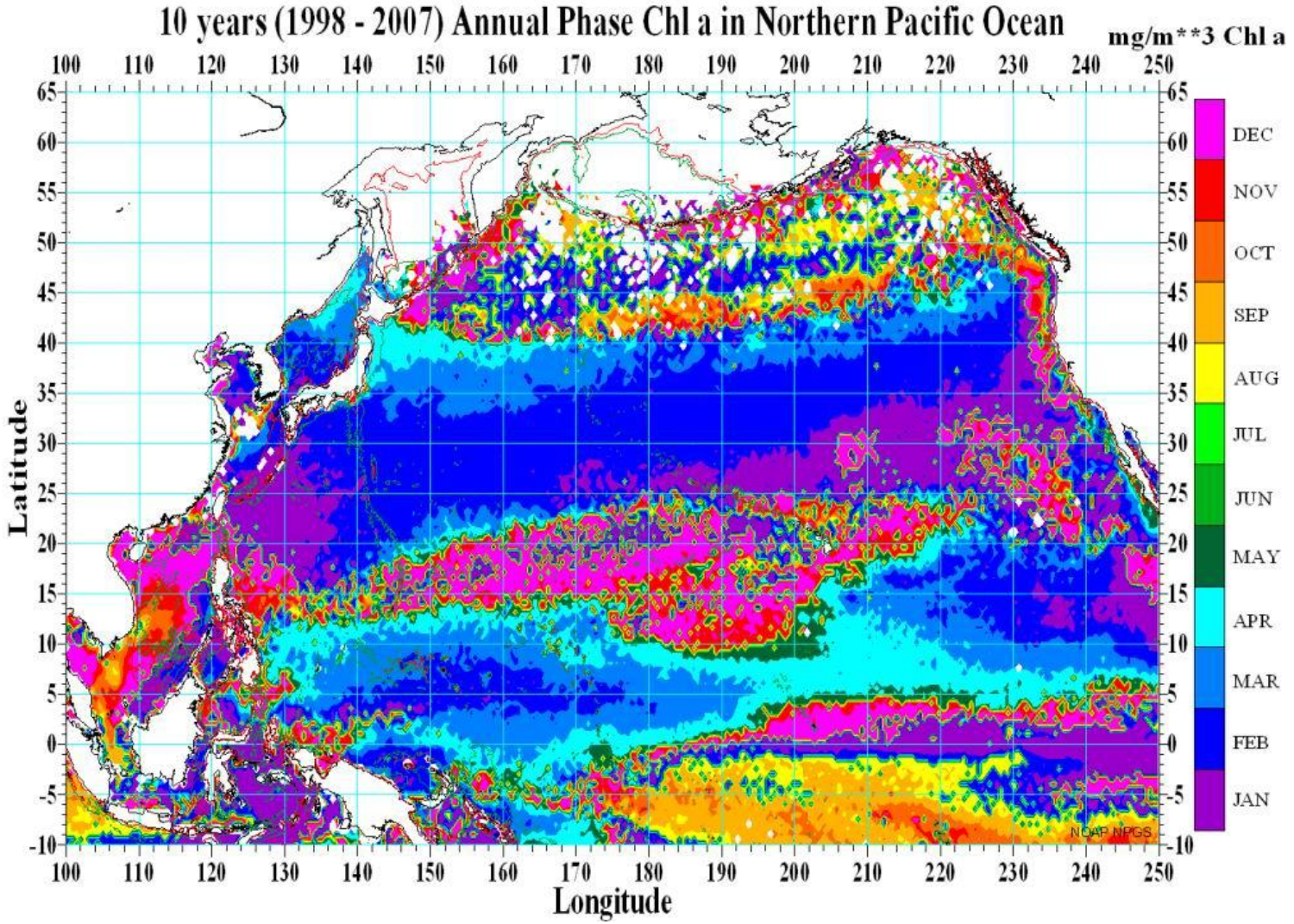
Mean Chl-*a* concentration (mg/m^3) in the North Pacific (1998-2007)



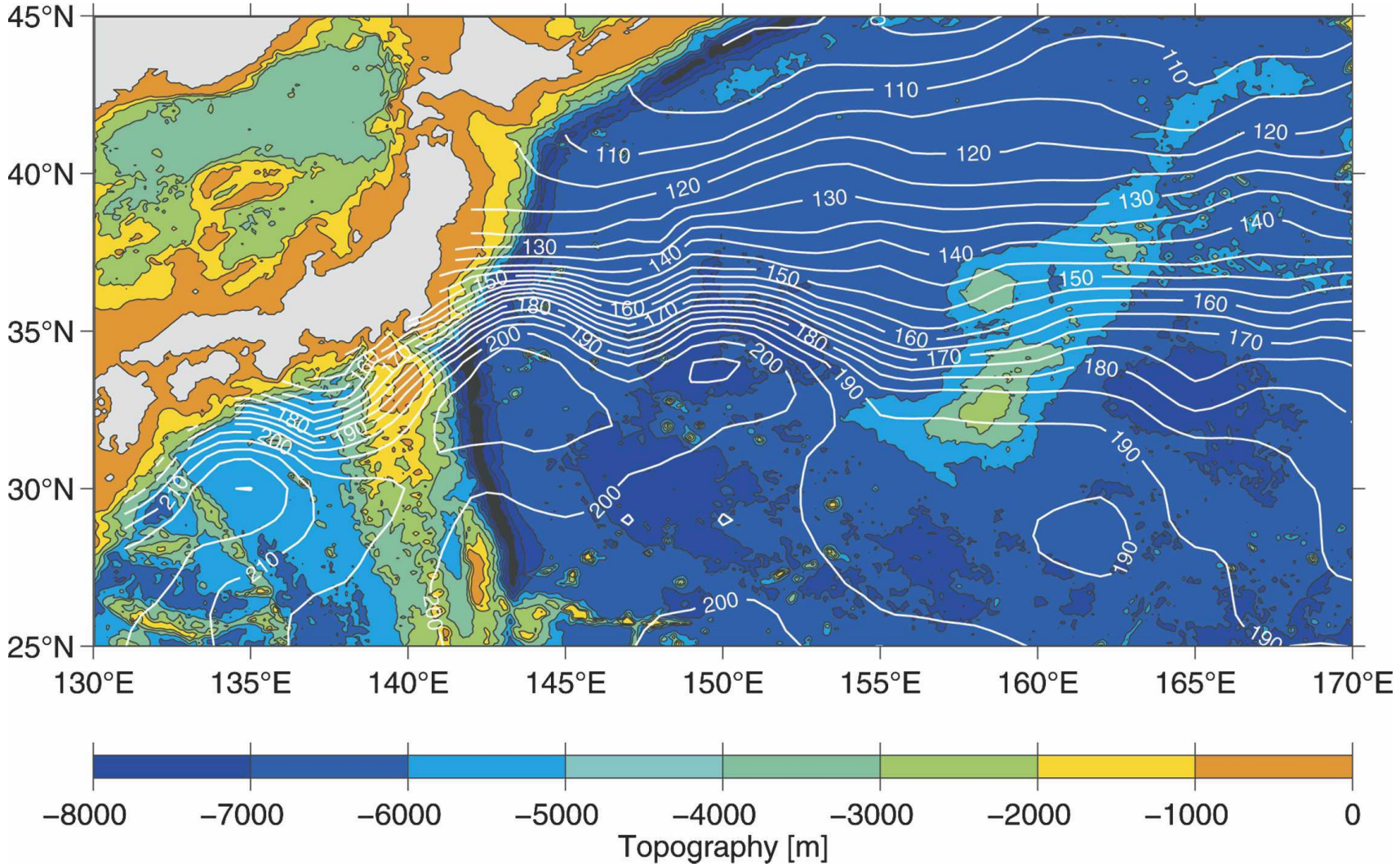
Annual Chl-*a* concentration Amplitude (mg/m^3) in the North Pacific (1998-2007)



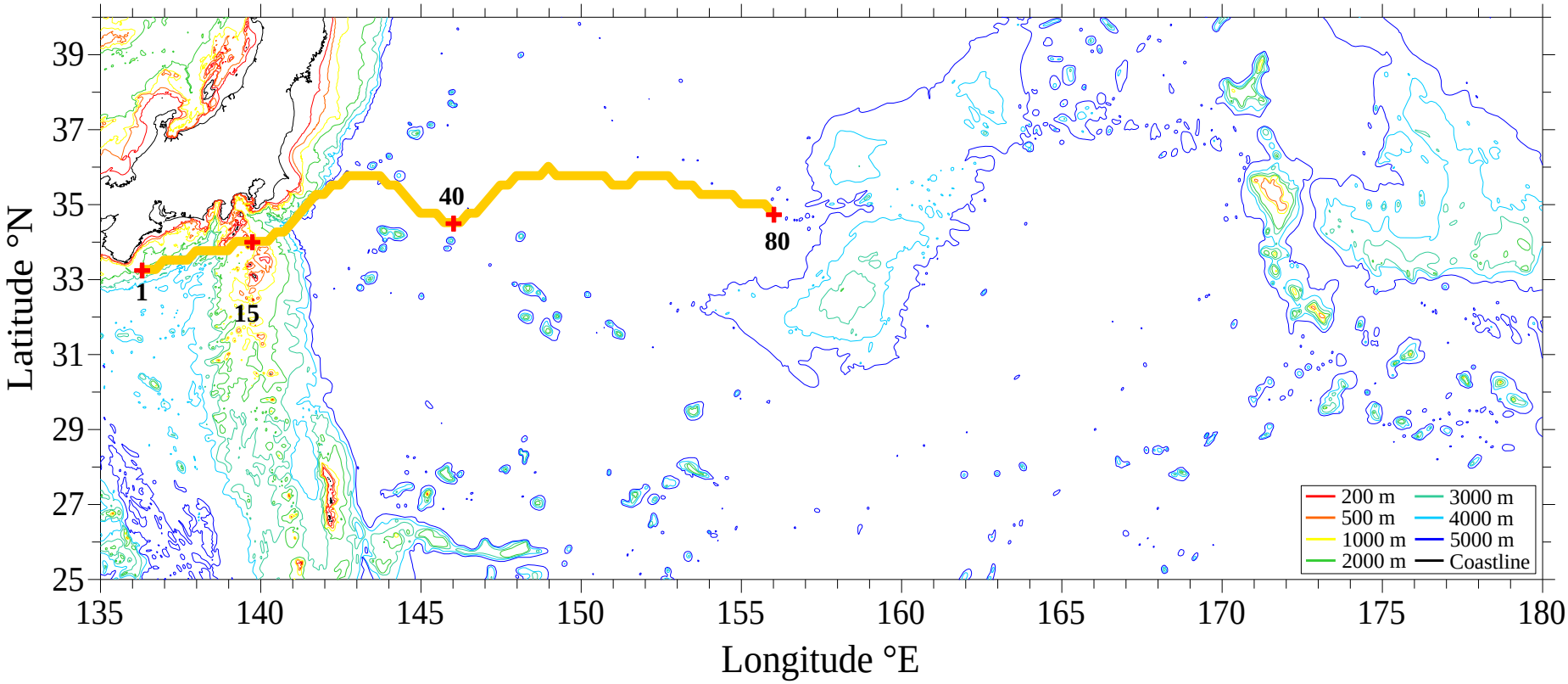
Phase of the Annual Chl-*a* Change in the North Pacific (1998-2007)



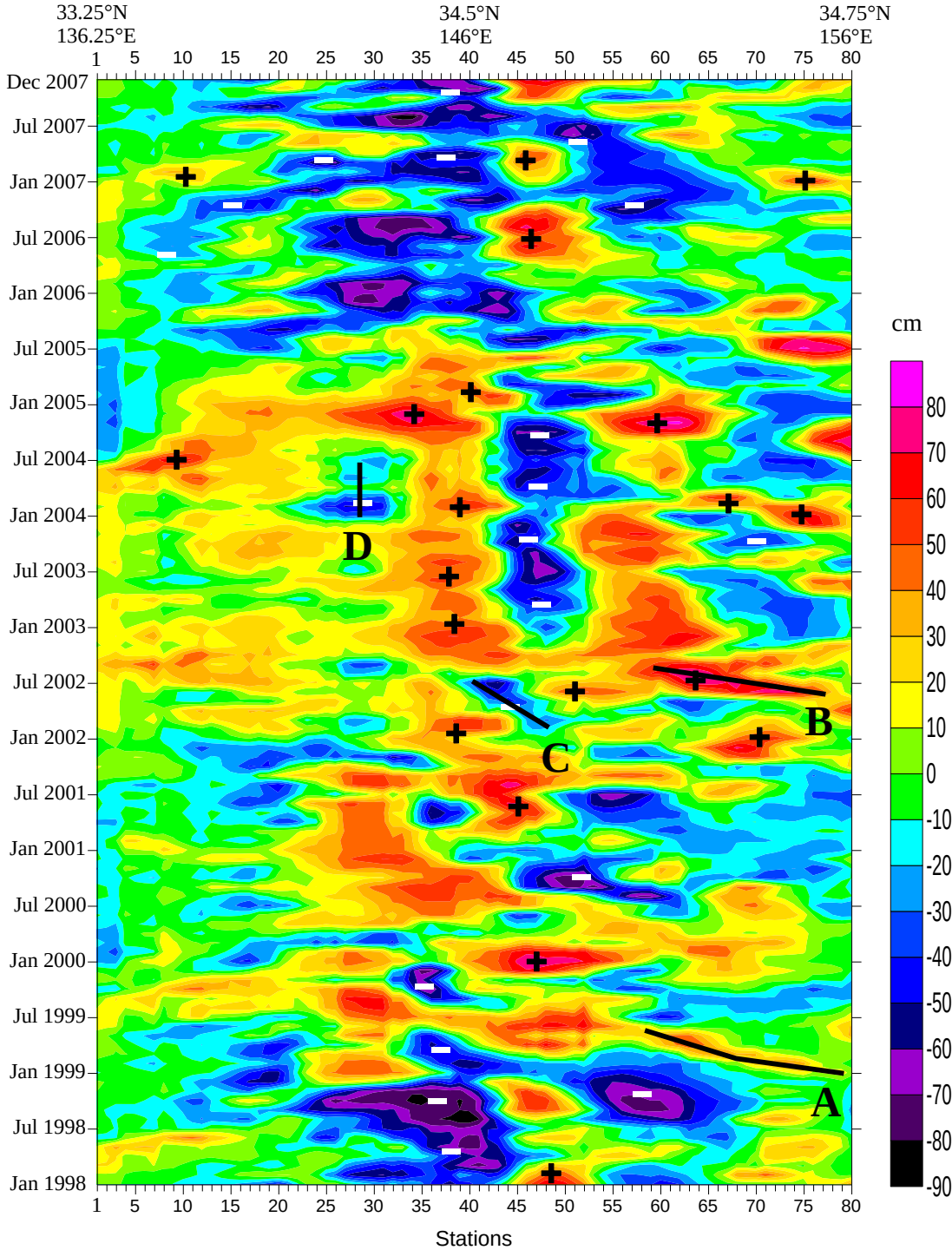
Mean Surface Dynamic Height
170 cm Contour → Kuroshio Extension (KE)
(Qiu & Chen 2005 JPO)



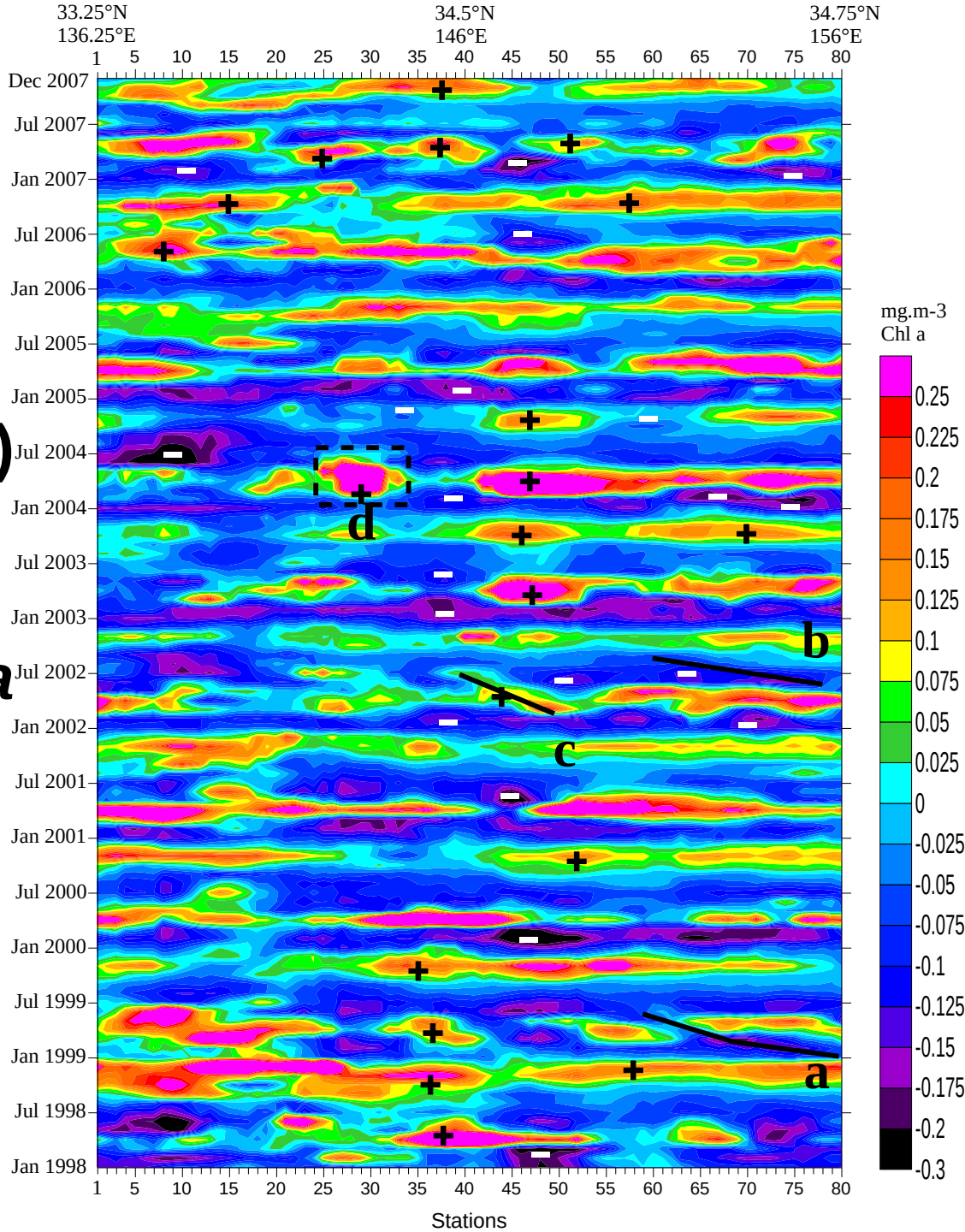
Topography of the studied area and Kuroshio Extension axis (marked orange) adopted for the present study. Stations positions 1, 15, 40 and 80 are marked.



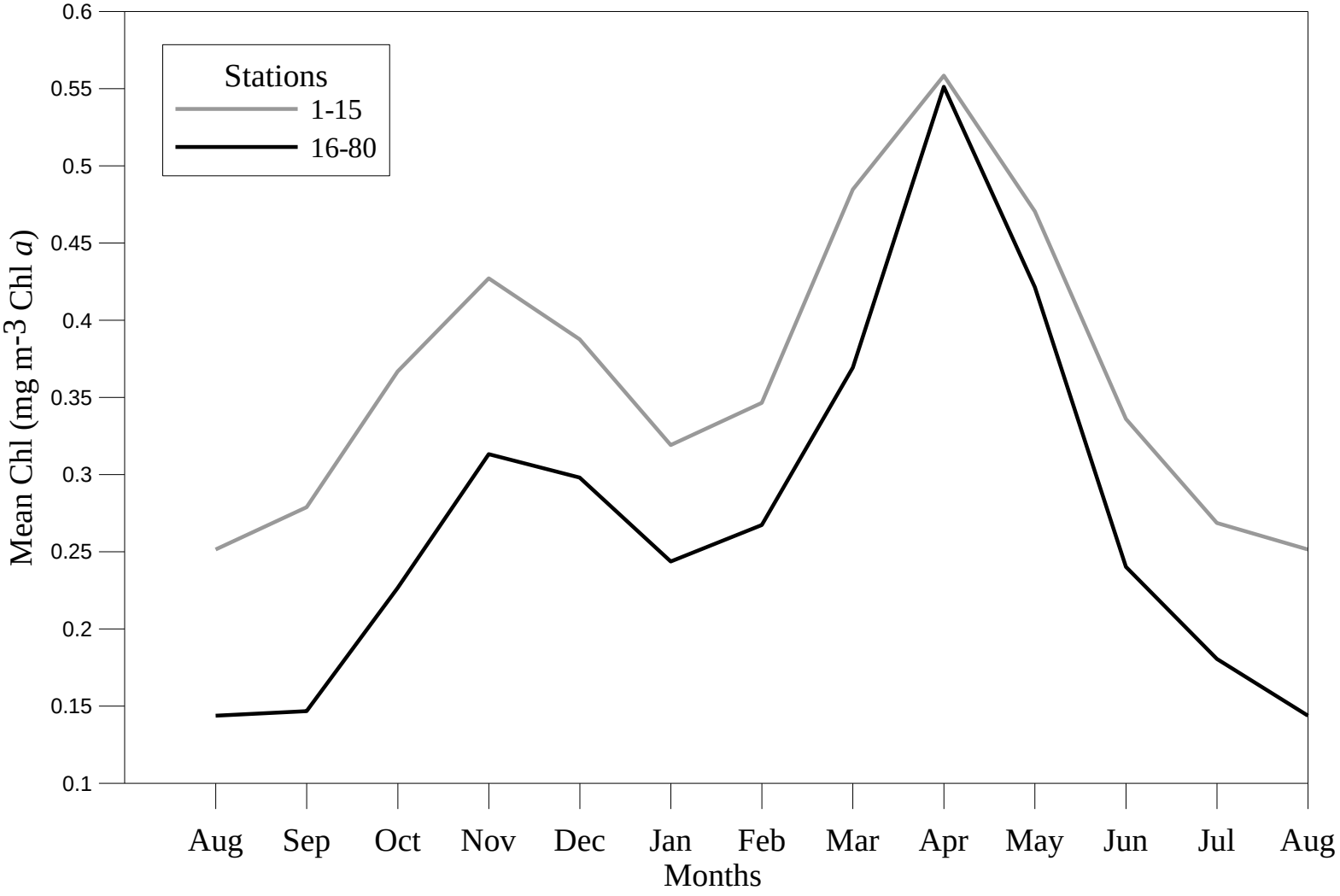
- **The altimeter signal is the SLA (cm) with the annual signal removed.**
- **Anticyclonic (A, B) and cyclonic (C, D) eddies have been followed in time and space.**



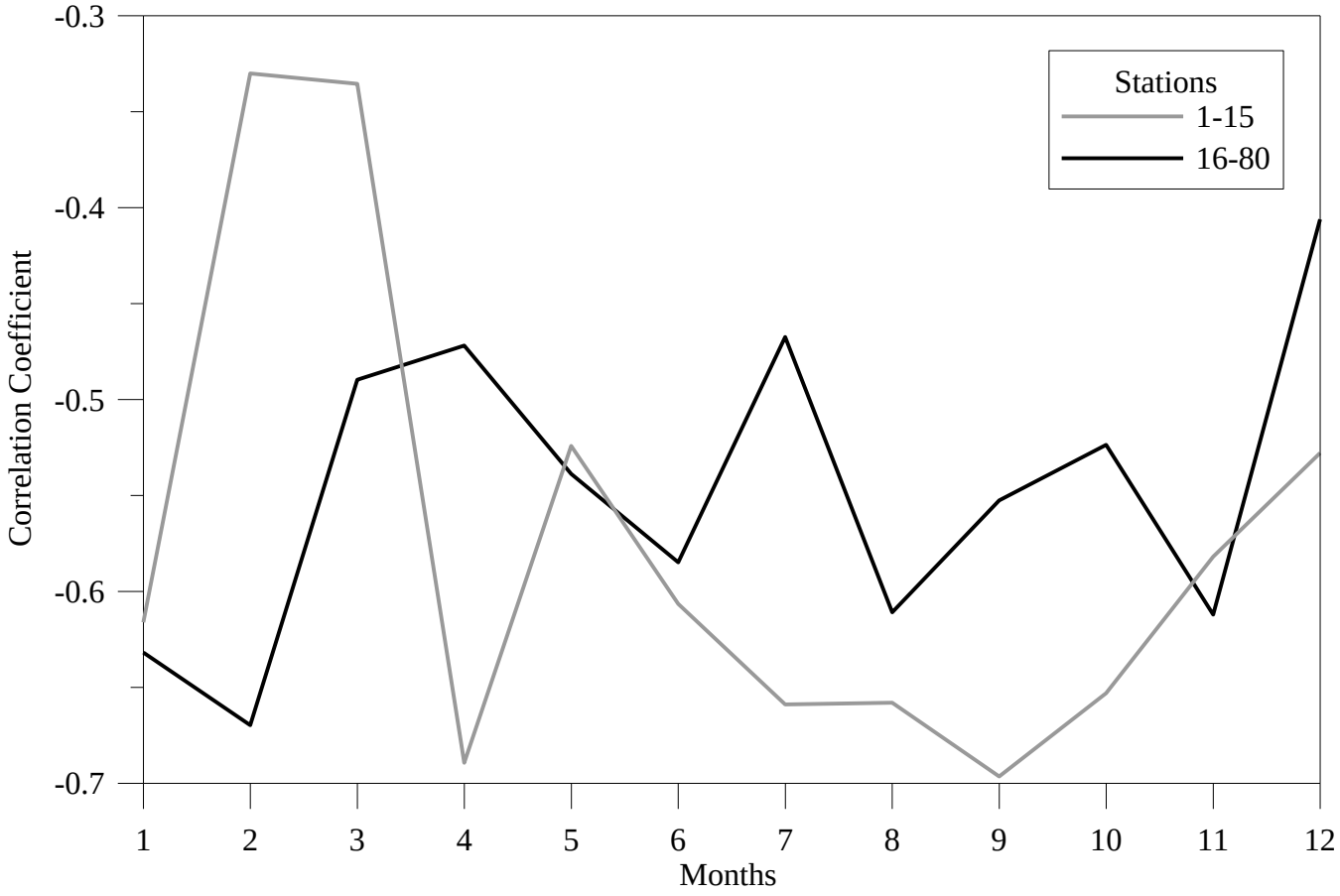
- **The Chl-*a* signal is the SeaWiFS Chl-*a* (mg m^{-3}) with the seasonal cycle removed.**
- **The high Chl-*a* (c, d) correspond to cyclonic eddies (C, D) and the low Chl-*a* (a, b) correspond to anticyclonic eddies (A, B).**



Chl-*a* (mg m^{-3} Chl *a*) seasonal cycle along the route of the Kuroshio Extension. The results for station 1-15 are in grey and for station 16-80 in black



Negative Correlation Coefficients SLA and Chl-a Anomalies



Conclusions

- (1) Seasonal Variability of SLA and Chl-a
- (2) Rossby wave propagation along the KE axis
- (3) Cyclonic eddies ←→ higher Chl-a

  Anticyclonic eddies ←→ lower Cjl-a